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ABSTRACT

The work reported here is part of an ongoing project to develop a language comprehension assessment instrument that: (1) is sensitive enough to pinpoint the particular language phenomena that are causing difficulty or have not been mastered, and (2) is also broad enough in scope to provide a credible and useful description of language proficiency. The instrument is called the Individual Diagnostic Assessment for Language and Reading Comprehension (IDA-LRC). Though it is seen primarily as an instrument for individual assessment, it is being developed and tested in a group mode. Language comprehension assessment should be based essentially on normal language development, that is, it should not reference scholastic knowledge or subject matter information. Assessment items should not involve areas of critical thinking or intellectual difficulty beyond the level of the inherent logical relations contained in everyday language. The content of the IDA-LRC is divided into four areas - decoding, syntax, semantics, and pragmatics - and each area contains one or more domains. Parts of the IDA-LRC have been tested in three studies, the results of which are discussed. Results demonstrate the potential of the instrument as a research tool in reading development and as a sensitive reading instrument. (CLK)

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On Assessing Language and Reading Comprehension:
the development of a diagnostic instrument*

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The absence of an adequate and valid instrument for measuring general language proficiency and reading proficiency in particular has resulted in continual problems and controversy in education. This absence has been especially problematic in educating children who for one or more reasons are not performing "normally" in these areas. There now seems to be general agreement that there are basically three classes of reasons for not performing "normally": (1) a developmental or learning disability; (2) a second language or minority dialect situation where the child's primary language or dialect is not standard English; (3) a behavioral difficulty such as an emotional problem or hyperactivity. However, the formulation of these taxonomies does not in itself give us much leverage on the problem. In order to be successful with an educational intervention or program, it is necessary to know which specific language phenomena or language related phenomena are the source or at least the symptoms of the difficulty.

The work reported here is part of an ongoing project to develop a language comprehension assessment instrument that (1) is sensitive enough to pinpoint the particular language phenomena that are causing difficulty or have not been mastered and (2) is also broad enough in scope to provide a credible and useful description of language proficiency. The instrument is called the Individual Diagnostic Assessment for Language and Reading Comprehension or IDA-LRC. We would like to make clear, however, that while we conceive of IDA-LRC as being primarily an instrument for individual assessment (rather than group assessment) it is being developed and tested in a group mode. As a consequence of this group mode feature, we are also using IDA-LRC to do basic research in the development of reading and language comprehension. The remainder of this report will be divided into four parts: underlying orientation, the current assessment instrument, some interim results, concluding comments.

Orientation

Underlying IDA-LRC are a number of assumptions and hypotheses which specifically motivate its content and structure. Some of these have to do with both aural and reading comprehension and assessment, others are particular to reading.

Our view of language comprehension assessment is that it should be essentially normal language development based. That is, ideally the assessment items should not reference scholastic knowledge or

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subject matter information. These items should be answerable on the basis of the common knowledge obtained from the child's everyday experience. Furthermore such assessment items should not involve areas of critical thinking or intellectual difficulty beyond the level of the inherent logical relations contained in our everyday language. Thus the ideal language comprehension assessment instrument should be content "free" or content independent. It should be an assessment of the child's ability to correctly respond to the syntactic structure and meaning relations (both semantic and pragmatic) that hold the language together. For these reasons, IDA-LRC is defined over a set of specific linguistic constructions and avoids items which draw on the so-called higher level cognitive processes.

We take a partially reductionist approach to comprehension assessment in that we assume that in order to be reliable, comprehension scores must reflect the comprehension of specific structures or relations. Thus IDA-LRC tests the comprehension of specified structures such as relative clauses, passive sentences, complex sentences, counterfactive relations, etc. These structures are generally tested in isolation rather than being embedded in a context such as a paragraph, since we do not want the comprehension of the structure confounded by the comprehension of the surrounding context. Furthermore there are sufficient tokens of each type of structure included in the test to ensure that the comprehension score for any particular structure is not random. But ours is only a partially reductionist approach since it is obvious that outside of our test items, children rarely need to respond to single sentences which lack a supporting context. Because of this we are also developing test items embedded in short paragraphs. However we have only tested one type of paragraph item so far. This principle of testing items both in isolation and in a larger frame carries over to our decoding section where we test the decoding proficiency for specific vowels and consonants with isolated words and in a sentence context (i.e., simple sentence domain).

An important principle which affects both the structure and content of IDA-LRC is the notion that some language structures or relations can be viewed as constituting a piece in a larger cluster or structure. Moreover, within the larger structure, certain constituents or structures are acquired later because they are harder or based on earlier structures. To illustrate this point with a simple example, active sentences like "John ate the fish" are correctly understood before full passive sentences like "The fish was eaten by John." And agentless passive sentences like "The fish was eaten" are understood before full passive sentences. Each such structure or sentence type we call a subdomain; a set of inter-related subdomains constitute a domain. Our assumption is that assessment scores based on hierarchically structured domains provide more valid indicators of the level of development of language comprehension than scores derived from testing groups of random or unrelated items. We view such domains as structural points within the language around which it has been found useful to develop further extensions and elaborations.

In regards to reading, our hypothesis is that for beginning readers, reading proficiency is the result of the interaction of proficiency in three areas: decoding, aural comprehension, and print comprehension. By decoding we mean the child's being able to take a word which is in his vocabulary and associate its printed form with his knowledge of its meaning; by aural and print comprehension we mean being able to associate sentences which one hears and reads respectively with a normally accepted meaning or interpretation. If a child does not possess sufficient decoding skills, he will not be able to read. Even with these decoding skills, he will not be able to read if he can't understand the material when he hears it. Thus we hypothesize that aural comprehension precedes reading comprehension and that an assessment based only on reading comprehension scores, without aural comprehension scores, may be misleading even when decoding skills are known to be adequate.

This raises an obvious question: "Are there children who are apparently adequate decoders and can understand a sentence or passage when received aurally, but still cannot comprehend this material when in print?" We will discuss data relevant to this question in the results section.

Structure of IDA-LRC

The current content of IDA-LRC is divided into four areas: decoding, syntax, semantics, and pragmatics. Each area contains one or more domains (see Table 1). For example, in the area of decoding we currently have four domains: consonants, vowels, polysyllables and simple sentences. These four domains cover 15 subdomains representing skills such as letter recognition, the decoding of initial consonants, consonant clusters, simple vowels, vowel sequences, as well as the ability to divide compound words, recognize roots and affixes, determine the full form of a contraction. We now have 13 domains either completed or under development.

Table 1

Current IDA-LRC Areas and Domains

AREAS	Decoding	Syntax	Semantics	Pragmatics
DOMAINS	Consonants	Active-Passive	Factive/ Implicative	Pragmatic Co-reference
	Vowels	Relative Clauses	Dimensional Adjectives	
	Polysyllables	Subjoined Clauses	Temporal terms	
	Simple Sentences	Syntactic Co-reference	If/Unless	

Table 2 shows the subdomain breakdown within three of our domains.

Table 2

Subdomain Breakdown within Three Domains¹

DOMAINS	Consonants	Active-Passive	Dimensional Adjectives
SUBDOMAINS	letter matching	nonreversible active	size
	initial consonant	reversible active	height
	final consonant	nonreversible passive	length
	consonant cluster (2)	reversible passive	tallness
	consonant digraph		width
	consonant cluster (3)		

Figure 1 (on the following page) contains a number of actual items from the decoding area.

Each subdomain is assessed by a minimum of eight and a maximum of 14 items. All items are multiple choice with either two or three alternatives to choose among. The criterion is set so that there is less than a 5 percent chance of passing by answering randomly. For example, a subdomain assessed through eight items required 7 out of 8 correct if it is a two-choice task (e.g., Yes/No) or 6 out of 8 for a three-choice task.

As of now there are 35 subdomains measuring comprehension in the areas of syntax, semantics and pragmatics. These domains were initially selected because (1) they provide broad coverage over a range of simple and complex sentences, (2) there is empirical evidence for a hierarchy of ordering difficulty between the subdomains that make up each domain.² For example the semantic domain called Factive and Implicative contains four subdomains which in order of increasing difficulty are:³

Figure 1. Sample Items from Decoding Tests

1.  A ☐
D ☐
d ☐
2.  van ☐
fan ☐
pan ☐
3.  bed ☐
beg ☐
ben ☐
4.  plum ☐
drum ☐
slum ☐
5.  ship ☐
chip ☐
slip ☐
6.  string ☐
sting ☐
spring ☐
7.  bog ☐
bug ☐
bag ☐
8.  nurse ☐
news ☐
nose ☐
9.  cone ☐
cane ☐
coin ☐
10.  cow ☐
cue ☐
caw ☐
11.  get ☐
gate ☐
goat ☐
12. backyard bac+kyard ☐
back+yard ☐
backy+ard ☐
13. careful ca+reful ☐
car+eful ☐
care+ful ☐
14. they'll they toll ☐
they will ☐
they soll ☐
15. The present was nice. ☐
John was present today. ☐
I can present it to him. ☐

Implicative

Bill let the ball hit the wall.

Did the ball hit the wall?

☐ ☐
Yes No

Factive

Bill knew that Ann took the ball.

Did Ann take the ball?

☐ ☐
Yes No

Factive-Negative subordinate clause

Jane is mad that Sue did not bring the book.

Did Sue bring the book?

☐ ☐
Yes No

Counter Factive

John pretended that he found the ball.

Did John find the ball?

☐ ☐
Yes No

Thus, any child who reaches criterion for the eight counter factive items will reach criteria on the three easier subdomains. Figure 2 is an example of a current test page.

Results

Parts of IDA-LRC have been tested in three studies. The first study involved 391 children from grades 1 to 7 in two Southern California elementary schools. These children were initially tested at the beginning of the school year. Discussion will be limited to some of the results of this study.

We will first discuss some of our results on the relation between consonants and vowels and then consider the relation between decoding and reading comprehension. The scores from our assessment subdomains indicate that children master the decoding subskills for consonants before they master the subskills for vowels. Table 3 shows that by second grade, over half the children are able to meet criterion in all consonant subdomains. By third grade, 80% of the children demonstrated control over all of the six subdomains. By contrast, we find that these first graders, as a group, do poorer on vowels than on consonants and that this differential in performance also holds for the second and third grade. Compare Tables 3 and 4.

Figure 2. Sample Test Page - Factives and Implicatives

- | | | |
|--|---------------------------|--------------------------|
| 1. Bob wished that he had a big sister.
Does Bob have a big sister? _____ | ☐ YES | ☐ NO |
| 2. Bill made believe that it was not dark outside.
Was it dark outside? _____ | ☐ YES | ☐ NO |
| 3. John pretended that he found the ball.
Did John find the ball? _____ | ☐ YES | ☐ NO |
| 4. Jane wished that she did not have a big brother.
Does Jane have a big brother? _____ | ☐ YES | ☐ NO |
| 5. Sue pretended that she did not find the ball.
Did Sue find the ball? _____ | ☐ YES | ☐ NO |
| 6. The boy made believe that he had bought the candy.
Did the boy buy the candy? _____ | ☐ YES | ☐ NO |
| 7. The boy wished that he had not lost the toy.
Did the boy lose the toy? _____ | ☐ YES | ☐ NO |
| 8. Ann made believe that it was dark outside.
Was it dark outside? _____ | ☐ YES | ☐ NO |

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Table 3

Percent Reaching Criterion on
Consonant Subdomains by Grade

Grade	N	Letter Matching	Initial Consonant	Final Consonant	Two Consonant Cluster	Digraph	Three Consonant Cluster
1	56	73%	68%	34%	16%	9%	4%
2	59	97%	95%	86%	81%	58%	59%
3	49	98%	94%	90%	96%	82%	80%
Total	154	89%	85%	70%	63%	48%	46%

Table 4

Percent Reaching Criterion on
Vowel Subdomains by Grade.⁴

Grade	N	CVC Sequence	Vr Sequence	VV Sequence	Multiple Pronunciation Sequence	VCe Sequence
1	46	13%	20%	15%	11%	13%
2	61	65%	41%	44%	48%	36%
3	45	78%	80%	71%	62%	69%
Total	152	53%	46%	44%	41%	39%

The only vowel subdomain in which more than half the second grade children were able to meet criterion was the one testing short vowels in CVC monosyllabic words.

The claim that consonant decoding skills are mastered before the vowel decoding skills is further supported by the analysis of consonant and vowel performance on an individual child basis. Out of a group of 82 second and third grade children, forty-eight children met criterion on four or five vowel subdomains (Table 5). Among these high scorers on vowels, only four children (8%) failed to meet criterion on five or more consonant subdomains. On the other hand, among the sixty-six out of 82 children who met criterion on five or six consonant subdomains, 22 children (33%) failed to meet criterion on four or more vowel subdomains.

Table 5

Distribution of Second and Third Grade Children
By Number of Vowel and Consonant Subdomains Mastered

		Number of Vowel Subtests on Which Criterion was Reached					Total
		1	2	3	4	5	
Number of Consonant Subtests On Which Criterion Was Reached	0	0	0	1	0	1	2
	1	0	0	0	0	0	0
	2	0	0	0	0	0	0
	3	2	0	1	0	1	4
	4	6	2	0	2	0	10
	5	1	4	7	2	4	18
	6	0	6	4	12	26	48
Total		9	12	13	16	32	82

Now we turn to some data on the relation between vowel decoding skills and comprehension. We point out that these findings are tentative since they are based on a set of data limited to one comprehension domain. However, it appears that meeting criteria on a minimum of three of the vowel subdomains is a necessary, but not always sufficient criterion for demonstrating at least some comprehension within the Factive-Implicative domain. The distribution in Table 6 shows that second grade children with two exceptions, do very poorly in their comprehension if they have not mastered at least three vowel subdomains.⁵

Table 6

Distribution of Second Grade Children
By Number of Vowel and Factive-Implicative Subdomains Mastered

		Number of Vowel Subtests on Which Criterion was Reached						Total
		0	1	2	3	4	5	
Number of Factive-Implicative Subtests on Which Criterion was Reached	0	9	6	3	2	2	1	23
	1	1	0	0	0	1	0	2
	2	0	0	0	0	0	1	1
	3	0	0	0	1	0	1	2
	4	0	0	0	1	0	1	2
	5	0	0	1	1	0	1	3
	Total	10	6	4	5	3	5	33

By third grade, nearly all children who show good comprehension abilities have mastered all five vowel subdomains (Table 7).

Table 7

Distribution of Third Grade Children
By Number of Vowel and Factive-Implicative Subdomains Mastered

		Number of Vowel Subtests on Which Criterion was Reached						Total
		0	1	2	3	4	5	
Number of Factive-Implicative Subtests on Which Criterion was Reached	0	2	1	1	0	4	1	9
	1	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0
	3	0	0	0	0	1	1	2
	4	0	0	0	0	0	2	2
	5	0	0	0	0	0	9	9
Total		2	1	1	0	5	13	22

Notice, however, that we cannot take it as a given that the better comprehension of the third grade children is a direct result of their superior vowel decoding skills (i.e., more than half the third graders reached criterion on all five subdomains). A few second graders show a comparable level of comprehension having mastered only three vowel subdomains. For some third graders the high level of vowel decoding and sentence comprehension may represent two partially independent developments.

You may have noticed that 10 of the 31 children in Tables 6 and 7 who reached criteria on three or more vowel subdomains failed to reach criteria on any Factive-Implicative subdomain. This raises the question of whether their low reading comprehension scores reflects or is independent of their aural facility with the same kind of materials.

In order to obtain some data on the relation between aural and reading comprehension we returned to the same schools 6 months later and tested 15 children who had earlier met criterion on three or more vowel subdomains. These children were tested within both aural and written material. We were only able to include four of the 10 children who failed all of the factive-implicative subdomains. The test items were identical to those given the children six months earlier. Each child had the Factive and Implicative items read to him and answered "Yes" or "No." Two days later he was tested on the same items in print. The aural-print sequence was used so that if there were any resulting biases because of the repetition of the material, it would be toward higher reading comprehension scores.

All children who reached criterion on any written comprehension subdomains also reached criterion on approximately the same number of aurally presented subdomains (plus or minus one subdomain). However, as Table 8 shows, there were four children who failed to reach criterion on any subdomain for the written test but earlier had reached criterion on two or three subdomains when presented aurally. These children are not completely lacking in decoding skills since six months earlier they had reached criterion on three or more vowel subdomains.

Table 8

Comparison of Reading vs. Aural
Comprehension for Factive-Implicative Domain

Child's I.D. Number	Reading mode- No. of Subdomains Reaching Criterion	Aural mode- No. of Subdomains Reaching Criterion
207	5	4
323	5	4
369	5	4
376	5	4
206	4	5
311	4	5
313	4	4
202	4	3
304	3	4
380	3	3
227	2	3
265	0	3
270	0	3
320	0	2
373	0	2

We seem to have identified a group of four children who demonstrate some decoding proficiency, but cannot comprehend in print, material which they can comprehend aurally.

Concluding Comments

We believe the results presented here demonstrate that IDA-LRC has potential as an effective research tool in reading development as well as a sensitive assessment instrument. We further believe

that only a researched assessment instrument can provide reliable, accurate, and valid assessment results. That is, the assessment instrument must be based on a set of hypotheses specifying the structure of the content area and the developmental stages or processes involved in comprehension. Furthermore, these hypotheses should be supported by empirical data. For example, our results suggest that vowel decoding assessments provide a more sensitive indicator of potential reading ability than consonant decoding assessments. This appears to be in conflict with the view held by some educators and reading researchers that consonants play a more important role in the decoding process than vowels. This view seems to be based on the observation that a sentence represented like A is easier to figure out than one like B:

- A. Th__ b__y f__nd y__ s__tt__ng __n
h__s b__t.
- B. A__ o__ ea__ i__e a__
__oa__.

The mature reader finds that it is easier to supply missing vowel information than missing consonant information. However, it is important to distinguish between the abilities and needs of the mature reader, the developing reader, and requirements of instructional materials. For whatever reasons, the mature reader seems to rely more heavily on consonant information.⁶ In the development of reading proficiency, it seems that consonants are mastered earlier than vowels. Moreover, the initial instructional emphasis on consonants over vowels may be appropriate in that it is the consonant information that play a major role in assigning the phonetic form of the vowel. But, based on our findings, we would argue that vowels provide the more reliable indicator for assessing the child's level of decoding skill in relation to the ability to understand printed material.

Footnotes

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¹ Examples of the consonant subdomains can be found among the sample item in Figure 3: letter matching - #1, initial consonant - #2, final consonant - #3, consonant cluster (2) - #4, consonant digraph - #5, consonant cluster (3) - #6. Examples of items in the Active-Passive Domain are: nonreversible active - John threw the ball; reversible active - John hit Bill; nonreversible passive - The ball was thrown by John; reversible passive - John was hit by Bill. Adjectives used in the Dimensional Adjective Domain are: size - big/small; height - high/low; length - long/short; tallness - tall/ short; width - wide/narrow; thickness - thick/thin.

² Some of the empirical research describing these within domain hierarchies can be found in Coker (1974), Coots (1975), Harris (1975), Hatch (1971), Kim and Legum (1976), Legum (1974, 1975, 1975), Rosenbaum (1974).

³ Implicative sentences are sentences whose main verb (e.g., let, get, manage - see Karttunen (1971)) enters into a relation with the subordinate clause such that if the sentence is in fact true the situation described in the subordinate clause occurred, e.g.,:

1. Bill let the ball hit the wall.
2. Bill wants the ball to hit the wall.

In sentence (1) the ball hit the wall, in (2) there is no statement about the actual event involving the ball. Implicative sentences also have the property that a negation on the main verb has a negative affect on the event in the subordinate clause:

3. Bill did not let the ball hit the wall.

Factive sentences (Kiparsky and Kiparsky 1970) are sentences with main verbs such as know, find out. The event in the subordinate clause is presupposed and thus required to have occurred, but unlike implicative sentences is not sensitive to negation:

4. Bill knew that Ann took the ball.
5. Bill did not know that Ann took the ball.

⁴ Examples of the vowel subdomains can be found among the sample items in Figure 1: short vowel in CVC sequence - #7; vowel plus r sequence - #8; sequence of vowels - #9; multiple pronunciation - #10; long vowel in final e words - #11.

⁵ In regards to these two exceptions, we feel that the results for the child who did not meet criterion on any vowel subdomain but reached criterion on one factive-implicative subdomain are probably not reliable. Either the vowel score is depressed or the comprehension score, though low, is still too high. The other exception could be legitimate.

⁶ Some of the reasons why consonants are more heavily relied on in English may be specific to the phonological structure of English words. For example, 1) English words contain more consonants than vowels, therefore consonants provide more cues for identifying the word; 2) consonants more frequently occur in word initial and final position, thus providing a frame which makes it easier for the reader to hypothesize possible, appropriate words.